This conclusion is based upon observations extending over upwards of forty years, and has been rather forced upon the attention of Sir John Lawes, than assumed in the first instance.

The central position of Hertfordshire (at least with regard to England), and the medium character of the soil and climate, afford some reason for expecting an average yield; and the various treatments to which the selected plots have been subjected also assist to secure an average and representative result. The selected plots are five in number, each of which has been similarly treated for the last forty-five years, and all of them have carried wheat every year during this long period. One of these plots has remained continuously unmanured and has yielded on an average 13 bushels per acre, which, strange to say, is one bushel above the official average crop of the United States of America. One has been continuously manured with fourteen tons of farmyard manure per acre, and has yielded an average of $33\frac{3}{4}$ bushels during the last thirty-six years. The remaining three selected plots have been treated with artificial manures upon a uniform and undeviating plan, and have yielded on an average respectively $32\frac{3}{4}$, $36\frac{1}{2}$, and $36\frac{3}{4}$ bushels per acre taken also over a period of thirty-six years.

The mean average of all these five plots taken over this long period is $27\frac{3}{8}$ bushels, and it is this *mean* which corresponds with, or at least closely approximates to, the average yield of the United Kingdom. The average yield of these five selected plots for the present year is $27\frac{5}{8}$ bushels per acre, equal to $26\frac{7}{8}$ bushels when calculated as of 61 pounds each. The average yield arrived at on the same principle last year was $28\frac{3}{8}$ bushels per acre, showing a deficit this year as compared with last of $1\frac{1}{2}$ bushel per acre. Again, comparing the result obtained from the Rothamsted standard plots with what is considered the usual standard average of 28 bushels per acre, the deficiency for the present year would appear to amount to $1\frac{1}{8}$ bushel per acre only.

Sir John Lawes's general deduction that the selected plots at Rothamsted fairly represent in yield the average of the United Kingdom is certainly an assumption which might be objected to on scientific grounds. It is, however, as already pointed out, rather to be regarded as an ascertained fact than as a simple assumption, and from the evidence of a large number of years, the fluctuations of yield at Rothamsted may be regarded as a barometer, if we may so express it, of the parallel fluctuations throughout the United Kingdom.

Judged by the standard of the Rothamsted yields, the wheat crop of 1888 is only slightly below the received average of 28 bushels per acre.

It is well known to agriculturists that the harvest of 1879 was the worst which the present generation has witnessed, and during the dismal summer which has now ended, many persons expressed an opinion that the harvest of 1888 was likely to equal in badness that of 1879. This discouraging view has, however, happily been dispelled, and the harvest of 1888, although inferior in both quantity and quality to an average one, is not to be reckoned as disastrous.

One important feature of the harvest of 1888 is, however, its irregularity, and this has not only given rise to many conflicting opinions, but made it exceedingly difficult to arrive at the truth.

The opinion of Sir John Lawes is that upon farms where the condition of the land was defective, as well as upon all lands where there was an excess of artificial nitrogenous manure, there was less than the average produce; but that when the manurial conditions were more favourable there was more than an average produce. Thus the continuously unmanured plot yields only 10 bushels per acre instead of 13, the average of the preceding 36 years. The farmyard manure plot, on the other hand, yields 38 bushels, against an average of only $33\frac{3}{4}$ bushels. Lastly, the plot which receives an excessive amount of nitrogenous manures in the form of ammonia salts, as well as mineral substances, yields only $35\frac{1}{4}$ bushels, against its average of $36\frac{1}{2}$ bushels. The result thus generally indicated is supported by experiments made beyond the list of the usually selected plots, and is in these experiments still more pronounced.

The economic conclusion arrived at by Sir John Lawes after carefully passing this evidence in review is that "Taking the average population of the United Kingdom for the harvest year 1888–89 at rather over $37\frac{3}{4}$ millions, the estimated requirements for consumption, at 5·56 bushels per head, would be about $26\frac{2}{3}$ million quarters. The area under wheat is reported to have been 2,663,436 acres, or nearly 300,000 acres more than last year. This area, at $26\frac{7}{8}$ bushels per acre, would yield nearly 9 million quarters (8,947,480), and deducting 2 bushels per acre for seed, there would remain rather over $8\frac{1}{4}$ million quarters (8,281,621) available for consumption, and there would therefore be required about $18\frac{1}{3}$ million quarters (18,394,271) to be provided from stocks and import. It is admitted that the wheat crop not only of America, but of some other countries whence we derive supplies, will be below the average. But during the last two months of the past harvest year our imports were at the rate of 21 million quarters per annum, and there seems no reason to fear that there will be any difficulty in obtaining sufficient supplies."

ON THE INFLUENCE OF LIGHT UPON THE EXPLOSION OF NITROGEN IODIDE.[1]

THE statement of L. Gattermann in his recent paper (*Berichte d. deutsch. chem. Gesellsch.* xxi. 751; following up V. Meyer's paper in the same volume, p. 26) on nitrogen chloride, that its explosive decomposition may be brought about, or its susceptibility to explosion much increased, by exposure to bright light, has recalled to my mind the fact, which did not specially impress me at the time, that I myself undoubtedly observed the same relation several years ago in the case of nitrogen iodide.

In a paper on the preparation and composition of the latter substance, published in the first number of this *Journal* (April 1879), it was noted that on two occasions the product obtained with the composition NI_3 or N_2I_6 "exploded in some quantity *under water* with much violence and complete shattering of the vessel."

I remember distinctly that in one of these cases I had just carried to a window, through which the sun was shining, the beaker full of water at the bottom of which was the black sediment of iodide, and was gently stirring the liquid with a glass rod, holding the beaker up so as to look at it from below, when the rod touched the lower part of the side or the bottom of the vessel, and the explosion occurred.

In the other case the iodide was being washed with ice-cold water of ammonia, the vessel standing on a table exposed at the time to the direct rays of the sun. I do not remember with certainty what seemed to precipitate the explosion on this occasion, but I believe it was the pouring some fresh liquid, from the height of a few inches, on the black sediment of iodide which had just been partially drained by decantation.

Under ordinary circumstances nitrogen iodide, while *wet*, exhibits no extraordinary sensitiveness, and may be safely worked with, only becoming highly dangerous on drying, so that I have little doubt that bright sunshine was influential in bringing about these two explosions. J. W. MALLET.

University of Virginia, May 8, 1888.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Dr. Hill, now Master of Downing College, having resigned the Demonstratorship of Anatomy, a senior demonstrator and two junior demonstrators at £100 and £50 stipends, and a University lecturer on advanced human anatomy are to be appointed, providing four teachers for the aggregate stipend, £250, formerly received by the Demonstrator. Starvation pay this, considering the limited opportunities in Cambridge for supplementing the income of an anatomist.

A grant of £80 from the Worts Fund is recommended to be made to Mr. M. C. Potter, to enable him to make botanical researches and to collect specimens in Ceylon during the coming winter.

The old Chemical Laboratory being now vacant, it is to be altered into a Pathological Laboratory for Prof. Roy.

The new scheme of examinerships in natural science was passed last week; the chief features being the appointment of two examiners each in elementary biology and chemistry, to take the 1st M.B., and the "specials" for the ordinary B.A. The stipends are rearranged, and in addition to a fixed amount a proportionate sum per candidate is allotted to the examiners, 5*s.* for Tripos candidates, 4*s.* for 2nd M.B. physiology and anatomy, and 2*s.* for the rest. Thus the examiners in anatomy and physiology, if 100 candidates

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[1] Reprinted from the *American Chemical Journal*, vol. x. No. 4.

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present themselves for the Tripos and 100 for 2nd M.B., will receive £75 each. The papers of all candidates in a subject are to be looked over by both examiners, who must be present at all oral examinations and at the final meeting of examiners.

The Harkness Scholarship in Geology and Palæontology, for women in their first or second term of residence, has been awarded to E. Macdonald, of Girton College.

H. F. Newall, M.A. of Trinity College, has been recognized as a teacher of physics, D. Carnegie, B.A. of Caius College, as a teacher of chemistry, and J. R. Vaizey, M.A. of Peterhouse, as a teacher of botany, for the purpose of giving certificates for M.B. degree.

At Jesus College, on December 11, there will be an examination for scholarships in natural science, the maximum value being £80. Notice must be given to the tutors before December 1. Chemistry is essential, and one of the following: physics, elementary biology, animal physiology. Christ's College examination will commence on the same date, and a candidate may be elected at either College.

At St. John's College the open scholarship examination on December 11 may include all the subjects of the Natural Sciences Tripos, but every candidate must show a competent knowledge of two of the following subjects: elementary physics, chemistry, and biology.

SCIENTIFIC SERIALS.

American Journal of Science, October.—On a young tortoise with two heads, by E. H. Harbour. An account is given of a two-headed *Chrysemys picta* recently found near New Haven, Connecticut, and presenting some interesting physiological features. They appear to be two independent organisms inclosed in a common carapace, with separate and even antagonistic instincts and impulses, as shown in their struggles to move in opposite directions, in their independent breathing, sleeping and feeding at different times, and so on. They were still alive and vigorous on September 4, fourteen weeks after capture.—The structure of Florida, by Lawrence C. Johnson. In this paper, which was read before the American Association for the Advancement of Science at New York last year, the peninsula is divided longitudinally into four regions plainly marked by surface indications: (1) the Gulf Hammock in the west; (2) a central plain, or region of sinks; (3) the High Hammocks, or lake region; (4) the eastern slope, draining to the St. John's River.—Analysis of a soil from Washington Territory, with some remarks on the utility of soil analysis, by Edward A. Schneider. The specimens here analyzed are from the Rockland Ridge near "The Dalles" on the Columbia River. From this study the author infers that the action of hydrochloric acid on soils is far from uniform; that plant roots probably derive their nutrition from the finest sediments of the soil; that hydrochloric acid powerfully corrodes both the finest and coarsest sediments; that fertility largely depends not only on the quantity of phosphoric acid, but also on the mode of its occurrence, and that consequently the fertility of a soil cannot be determined by chemical analysis alone.—On the Rosetown extension of the Cortlandt series, by J. F. Kemp. The discovery of this extension of the well-known Cortlandt series is accredited to Dr. N. L. Britton, and the Rosetown area, due west of Stony Point, is here definitely circumscribed.—The contact-metamorphism produced in the adjoining mica-schists and limestones by the massive rocks of the Cortlandt series near Peekskill, New York, by George H. Williams. In previous papers were described the principal types and some intermediate varieties forming the complicated group of this series. Here the author deals with the unusual contact-metamorphism which they have occasioned in the adjoining schists and limestones, concluding with a summary of the evidence in favour of the eruptive origin of the massive members of the series.—The sedentary habits of Platyceras, by C. R. Keyes. The sedentary habits of this group of Palæozoic Gastropods is inferred from the analogous habits of their modern congeners, and from their attachment to various species of Crinoids during life.—On edisonite, a fourth form of titanic acid, by W. E. Hidden. The specimen here described is from the Whistnant gold mine, Polk County, California. Its analysis shows it to be a nearly pure TiO_2, like rutile, but differing in its crystallization from the three previously known forms of that mineral.—On two new masses of meteoric iron, by George F. Kunz. The first of these specimens, from Linnville Mountain, North Carolina, closely resembles the Tazewell, Claiborne, and Bear Creek (Colorado) meteorites in composition; the second, from Laramie County, Wyoming, approaches nearer to those of Rowton, Charlotte, and Jewel Hill.—Experiments on the effect of magnetic force on the equipotential lines of an electric current (continued), by E. H. Hall. An account is here given of the author's experiments with cobalt, nickel, and bismuth, together with a summary of results.—W. Spring gives a further account of his views regarding the compression of powdered solids, in reply to Mr. Hallock; and E. S. Dana contributes a short preliminary notice of beryllonite, a new mineral so named by him from the fact that it contains the rare element beryllium.

THE *American Meteorological Journal* for September contains:—(1) An article by Prof. J. E. Curtis on suction anemometers. Two different forms of such instruments have been proposed, corresponding to two distinct ways in which a moving fluid produces a diminution of pressure. In the first the suction is produced by the wind blowing through a horizontal tube, having a contracted section; in the second the suction is produced in a vertical tube, by the wind blowing across its mouth. The second form alone has come into limited use, under the name of the Hagemann anemometer. The author points out that these instruments are not more generally used partly because there is a feeling of uncertainty as to the definite relation of the suction to the wind's velocity. The paper deals almost exclusively with their history and theory. (2) An account by Mrs. J. N. Brodhead of her experience of the great cyclone at Calcutta, on October 5, 1864. (3) An article by Prof. H. A. Hazen on the advantages of Mount Washington as a meteorological station. No individual station has had its observations discussed more thoroughly, and one of the most important investigations has been the use of the observations in determining a proper reduction of barometric readings at great altitudes to sea-level, by Lieut. Dunwoody.

Bulletin de l'Académie des Sciences de St. Pétersbourg, vol. xxxii. No. 3.—On the determination of constants of the ellipsoid of the earth by means of geodetical measurements, by A. Bonsdorff. This paper contains new formulæ for the calculation of the eccentricity.—On the formation of meteoric currents from the disintegration of comets, by Dr. C. Charlier, being a mathematical inquiry into the orbits of meteorites.—On the aberration of fixed stars, by M. Nyrén. After having calculated it on the ground of observations of two stars, the Comes and the Polaris, M. Nyrén obtains very nearly the same numerical values as those formerly found for the same stars by W. Struve.—On a new method for determining the focal distance of a system of lenses for different rays of light, by Dr. Hasselberg.—Some remarks on the fables of Phædrus, by A. Nauck.—A note by Dr. W. Radloff on grave-inscriptions in Semiryetchensk.—On the phenyl-angelic acid, by A. Gernet.—The approximate elements and ephemerides of Encke's comet for 1888, from May 12 to August 28, by O. Backlund and B. Seraphinoff.—The tale of the Princess Bentres compared with the tale of the Emperor Zenon and his two daughters, by Dr. O. Lemin. (All in German.)

No. 4.—Diagnoses of new Asiatic plants, by Dr. C. J. Maximowicz, being the seventh instalment (in Latin, with four plates) of a capital work about new plants brought by Przewalski, Potanin, Taschiro, and several others, from Central Asia, Japan, &c.—On the "hyperelementary" terms in the theory of perturbations, a mathematical inquiry, by O. Backlund (in German).

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, October 22.—M. Daubrée in the chair.—On lameness caused by pain, by M. Marey. By means of his photo-chronograph the author studies the character of the peculiar limping action instinctively caused by the desire to diminish the pain of a sore foot in walking. From the standpoint of the mechanical laws regulating the pressure of the foot on the ground, the three cases are considered in which this pressure is either equal to, greater, or less than, the weight of the body.—A paper follows by the same author, in which the swimming action of the eel is studied and illustrated by the same photo-chronographic process. The eel was 0·30 m. long, reduced by its squirming action to 0·29 m., and its rate of progress was shown to be 0·019 m. in 0·1 second, or about

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